

In re Application of: Moshe EINAT et al
Serial No.: 10,566,481
Filed: January 31, 2006
Final Office Action Mailing Date: July 16, 2009

Examiner: Solomon, Lisa
Group Art Unit: 2861
Attorney Docket: 31267
Confirmation No.: 5758

REMARKS

Reconsideration of the above-identified application in view of the amendments above and the remarks following is respectfully requested.

Claims 38, 40 – 43, 47 and 59 are pending in this Application. Claims 1-37, 44-46, 48-58 and 60-79 have been withdrawn from consideration. Claim 39 has been canceled. Claims 38, 40 – 43, 47 and 59 are rejected. Claims 38 and 59 have been amended herewith. New claims 80 and 81 have been added herewith.

Rejections – 35 USC 103

Claims 38, 42 and 59 are rejected under 35 USC 103a as being unpatentable over the combination of Hsu, Baker and Koitabashi.

The present application discloses an ink jet print head comprising a plurality of nozzles for controlled formation and release of ink drops for printing. In the print head, each nozzle is associated with a corresponding local ink storage reservoir for replenishment of the nozzle with ink. The local storage reservoir serves the purpose of feeding ink to its corresponding nozzle by capillary action. The local ink storage reservoir is open to environmental pressure, in contrast to conventional systems which often use pressurized systems and particularly negative pressure.

Baker discloses a thermal ink jet pen including a housing having a support surface at one end with an opening for passing ink to an adjacent thin film resistor type thermal ink jet printhead. A porous foam material is mounted within the housing and receives and retains a supply of ink for feeding the ink by capillary action.

Examiner rejects Applicant's arguments with respect to claims 38, 40-43, 47 and 59. Examiner says that Applicant has wrongly drawn the conclusion that use of sponge or porous foam material as indicated in Baker et al. is generally problematic when using capillary action, as it is impossible to clean if the ink dries and thus

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implies that Baker does not use capillary action. Examiner says that Baker discloses the supply of ink by capillary action.

Regarding claim 38, Examiner points out that Hsu teaches an ink jet print head comprising a print head matrix, as per Hsu Fig. 15. Baker teaches one reservoir supplying a single nozzle and Koitabashi teaches supplying nozzles from a group of nozzles.

Applicant in response amends the claim to define *that each nozzle of the matrix is provided with its own individual reservoir through which it is supplied from an ink supplying surface using capillary action*. None of the citations teach in combination the fourfold feature of 1) a matrix of nozzles, 2) an individual reservoir per nozzle, 3) an ink supply surface and 4) supplying each nozzle through its respective reservoir by capillary action.

In particular, none of the citations teaches feature 3) of an ink supply surface that supplies ink to the reservoirs. Therefore their combination does not teach this feature.

Examiner alleges that reference numeral 220 in Hsu teaches an ink supply surface. However numeral 220 in Hsu column 5 lines 35 to 36 refers to an ink cartridge, not to an ink supply *surface of the matrix*. Specifically the claim wording provides:

"said local reservoirs opening onto an ink supply surface of said matrix".

Thus claim 38 requires that the ink supply surface is *part of the structure of the matrix and each reservoir opens on to the ink supply surface*. These limitations are not taught by the ink cartridge of Hsu, and neither are they found in the other citations.

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Thus claim 38 is believed to allowable as its teachings are not present or hinted at in the combination of documents cited by the Examiner.

Claims 40, 43 and 47 depend from claim 38, and hence the present amendment of claim 38 is believed also to overcome the rejection of claims 40, 43 and 47.

The Applicant amends 59 to further distinguish the present invention. It is noted that in Baker's system, capillary action is aided by compression while the currently claimed embodiments use unaided capillary action. Specifically, the supply action of the sponge by Baker is supported by compression. Paragraph 3 lines 12-17 of Baker states

"The plug 50 further includes foam compression tabs 56 which extend into foam sections 42, 44 and 46 as shown and provide *a desired amount of compressive forces to the foam for further increasing capillary forces* in the foam and optimizing ink dispensation to the printhead".

Likewise in Koitabashi, although feed of ink by capillary action is disclosed in embodiment 15, Koitabashi does not teach ink supply at atmospheric pressure without the aid of compression. Column 27 lines 62 and 63 in Koitabashi which describes embodiment 15 states

"an ink absorbing material 3202 having an adjusted capillary force...".

Column 28 lines 25-27, which is a continuation of the previous text and which describes the same embodiment (embodiment 15) states:

"this material having an enhanced capillary force by compression, between the ink chambers".

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Thus, the word "adjusted" in column 27 means "enhanced by compression" and thus Koitabashi does not teach ink supply at atmospheric pressure without the aid of compression, contrary to the requirements of the present claims.

Hsu does not use capillary action at all.

The present invention as claimed in claim 59, by contrast, uses capillary action which is *not* supported by compression for feeding the ink. The present application discloses an ink jet print head comprising a plurality of nozzles for controlled formation and release of ink drops for printing. In the print head, each nozzle is associated with a local ink storage reservoir for replenishment of the nozzle with ink. The local storage reservoir serves the purpose of feeding ink to at least one nozzle by capillary action without the aid of compression.

There is no solution known or hinted in the prior art that allows feeding by capillary action without using compression. A benefit of using capillary action without a compression mechanism is to free the overall size of the printhead from mechanical considerations. A matrix may be constructed in which any number of nozzles can be provided simply by connecting each nozzle to a reservoir. No complicated feed mechanisms are required and thus it becomes feasible for the first time to provide print heads which are the size of standard paper, allowing rapid single action printing of a whole page. The elimination of mechanical feed parts thus removes a long standing limitation on the size of print head. This benefit is described in page 12 lines 13-15 of the present application where it says "It is therefore appropriate that the local ink storage reservoir is open to environmental pressure, in contrast to conventional systems which often use pressurized systems and particularly negative pressure. As feeding of the ink is by capillary action and is independent of

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pressure, the ink feed mechanism ceases to provide an intrinsic limitation on the size of the print head. "

Claim 59 has thus been amended to reflect the difference by claiming that the capillary action is not assisted by compression. Claim 59 is thus believed to be allowable.

Applicant adds new claims 80 and 81 which claim a two dimensional print head matrix, having a plurality of nozzles extending along respective two dimensions of the matrix and where the reservoirs are coextensive with the respective nozzles over the matrix in the two dimensions, and which feed the nozzles from an ink supply surface. Such a matrix of nozzles and corresponding reservoirs under an ink supply surface is not disclosed in Baker, Hsuor Koitabashi. Such a matrix is useful because it may provide full coverage of standard sized printing media without any complicated mechanical structures, thus allowing single pass printing from a reliable print head.

All of the matters raised by the Examiner have been dealt with and are believed to have been overcome.

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In view of the above amendments and remarks it is respectfully submitted that claims 38, 40 – 43, 47, 59, 80 and 81 are now in condition for allowance. A prompt notice of allowance is respectfully and earnestly solicited.

Respectfully submitted,

/Jason H. Rosenblum/

Jason H. Rosenblum
Registration No. 56437

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Enclosures:

- Petition for Extension (three Months)
- Request for Continued Examination (RCE)